infective disease. A disease introduced into virgin soil is apt to spread rapidly; where the soil is not virgin there is frequently a periodicity which at present cannot altogether be explained. Thus the ordinary "zymotic" diseases in the British Isles, diphtheria, scarlet fever, &c., have a seasonal and an epidemic periodicity; other diseases, notably influenza and plague, may for years be almost unknown, and then an epidemic prevalence may become established over such large areas that the disease becomes pandemic. The same unknown causes may have much to do with the extinction of leprosy in the British Isles and elsewhere.

R. T. HEWLETT.

## NOTES.

THE Russian Imperial Geographical Society has conferred the Lütke gold medal—its highest distinction—on Sir John Murray, K.C.B., F.R.S., for his oceanographical and limnological researches. The medal has only once before been conferred on a foreigner, namely, Prof. Suess, of Vienna, the eminent geologist.

MR. JAMES HORNELL, who acted as Prof. Herdman's assistant during the Ceylon pearl oyster investigation, has been appointed marine biologist to the Government of Ceylon, and inspector of the pearl banks. Mr. Hornell is now preparing for an inspection by means of dredges in place of divers, with the view of carrying out the changes recommended in Prof. Herdman's report. The appointment is of interest as showing how in the recognition of science some of our colonies are in advance of the mother country. We have no "marine biologist to the Government" here.

DR. J. E. MARR, F.R.S., was elected president of the Geological Society at the anniversary meeting held last Friday. Sir Archibald Geikie delivered the anniversary address, his subject being continental elevation and subsidence. The medals and funds at the disposal of the society were presented as already announced (p. 255).

THE death is announced of Prof. Callandreau, professor of astronomy in the Paris École polytechnique, and member of the Paris Academy of Sciences.

AN astronomical society has been formed at Newcastle-upon-Tyne under the presidency of the Rev. T. E. Espin, who will give the first lecture, at the Literary and Philosophical Society's rooms, on Friday, March 11, on "The Work of an Amateur Observatory." The hon. secretary of the society is Mr. J. D. Hastings, Warkworth House, Tynemouth.

A BILL for rendering compulsory the use of the metric system of weights and measures in the United Kingdom was read a second time in the House of Lords on Tuesday and referred to a select committee. The Bill provides that the metric system shall become compulsory on April 5, 1906, or at such later date as may be directed by His Majesty by Order in Council. It is, therefore, left to the discretion of the Government to fix the date for inaugurating the compulsory adoption of the system. In moving the second reading of the Bill, Lord Belhaven referred to the recommendations of the Select Committee of the House of Commons in 1895, and pointed out the educational and commercial advantages which would follow the adoption of the metric system in the place of our present irrational standards. Lord Kelvin, speaking in support of the Bill, remarked that in Germany, France, and Italy, no inconvenience had resulted from the introduction of the metric system. He said it was of interest to know that the decimal system originated in England. In a letter dated November 14, 1783, James Watt laid down a plan which was in all respects the system adopted by the French philosophers seven years later, which they suggested to the King of England as a system that might be adopted by international agreement. James Watt's objects were to secure uniformity and to establish a mode of division which should be convenient as long as decimal arithmetic lasted. Speeches in favour of the Bill were made by Lord Wolverton, the Marquis of Lansdowne, and the Earl of Rosebery.

THE Reale Accademia dei Georgofili, of Florence, offers a prize, a diploma, and a silver medal for the best essay on the fiscal policy in Italy in relation to that of other countries from the introduction of the 1887 tariff to the end of 1903. The competition closes on June 30, 1905. The Olympic Academy of Venice offers a prize, the subject being Italian emigration in South America, and the last day being December 31, 1906.

THE *Revue générale des Sciences* contains an account, by M. A. de Lapparent, of the life and work of M. Munier Chalmas, who died at Aix les Bains on August 8, 1903, scarcely three months after his election into the Académie des Sciences. M. Munier Chalmas was born in the Beaujolais district in 1843, and at the age of fourteen his interest in geology was aroused by his meeting a geological party of students near Paris, conducted by M. Hébert. At nineteen he had studied under Cordier and D'Orbigny. On the death of M. Hébert in 1890 a movement was set on foot to appoint him to the chair thus vacated at the Sorbonne. M Munier Chalmas's contributions to palæontology were numerous and varied, and dealt with the calcareous algal remains previously regarded as Foraminifera, the dimorphism of Nummulites and Miliolidæ, the classification of echinids, the morphology of brachiopods, and the embryonic development of ammonites. The present state of our knowledge of the geology of the Paris basin is largely due to his researches. He rendered valuable services in the preparation of the geological map of France, and his investigations extended also to Dalmatia and Hungary.

THE death is announced of Prof. Arthur W. Palmer, head of the department of chemistry of the University of Illinois. Prof. Palmer, says *Science*, graduated from the University of Illinois in 1883, and was for two years assistant in the department of chemistry. In 1890, after studying for two years at Harvard University and one year in Germany, he was appointed professor of chemistry, and has since served continuously in that capacity. As member of the Chemical and Biological Survey, he had lately completed an important report on the water supply of the State of Illinois, and was the author of many papers embodying the results of chemical investigation.

AT the annual general meeting of the Institution of Mechanical Engineers on February 19, the annual report of the council for the year 1903 was presented, and contains the following announcements among others. The sixth report of the Alloys Research Committee has been completed. It deals with the experiments made, under the late Sir William Roberts-Austen's direction, on the tempering and annealing of steel, by Mr. William H. Merrett and by others. At the request of the committee the report was completed by Prof. Gowland. The first report to the Steam-Engine Research Committee, by Prof. D. S. Capper, has been received, and will shortly be presented. Prof. Burstall reports that the 100 B.H.P. gas engine which has been designed for experimental work in connection with the Gas-Engine Research Committee is now ready to be tested at the works. Prof. T. Hudson Beare, the reporter to the Committee on the Value of the Steam Jacket, carried out during the summer and autumn a number of experiments with the experimental jacketed vessel; the results obtained are now being worked out, and further experiments are in progress. New, and it is hoped more satisfactory, valve arrangements for admitting the steam to and exhausting it from the experimental vessels are now being designed. A cordial invitation from the American Society of Mechanical Engineers to hold a joint meeting in Chicago, with the view of visiting afterwards the St. Louis Exhibition, has been accepted by the council on behalf of the members.

PROF. F. G. BAILY, in a short article in the *Electrician*, gives the results of some tests on the efficiency and colour of the new osmium lamps. He finds that the consumption of power at the correct running voltage is about 1·9 watts per candle, and that the colour of the light at this efficiency is practically the same as that of a carbon lamp running at 2·1 watts per candle. From this it seems that the osmium filament is slightly superior to a carbon filament as a radiator, though the main cause of the higher efficiency of the lamp is the higher temperature which the osmium filament can stand. The only trustworthy life tests yet published are those made by Prof. Wedding, who found an average life of 1900 hours from a test on eighteen lamps starting at an efficiency of 1·7 watts per candle; at the end of the life the candle-power had fallen off about 20 per cent., and the efficiency was 2·1 watts per candle. According to Prof. Baily's tests, the osmium lamp is not quite so sensitive to voltage variations as a carbon lamp; at the same time the difficulty of producing a high voltage lamp does not seem to have been overcome, the highest P.D. for which lamps are manufactured being 55 volts. This cannot fail to act as a great drawback to the introduction of the lamp into commercial use.

MR. H. C. RUSSELL, Government Astronomer of New South Wales, has sent us a copy of the results of rain, river and evaporation observations made in that colony during the year 1900; the tables are illustrated by maps and diagrams. Mr. Russell states that the year's rainfall is a little better than that of the five preceding years, but it was nevertheless much below the average fall. Our knowledge of the distribution of rain over New South Wales is almost entirely due to Mr. Russell's persistent exertions; when he first undertook the systematic collection of rainfall statistics in the colony, in the year 1870, he found only five rain gauges in use; at the present time (1900) the number of recording stations has increased to 1703. Mr. Russell's study of the periods of floods and droughts has led him to the conclusion that these periods have followed each other with regularity, and he predicts that in 1904 and 1905 the rainfall will be abundant. In support of this he states that he has discovered, to his own satisfaction, that the rainfall is controlled by the moon, and he gives a diagram showing that when the moon's course is to the southward, in the southern hemisphere, more rain falls than when the moon moves to the northwards.

*Symons's Meteorological Magazine* for this month contains the very interesting summary of the climate of the British Empire during the year 1902, in the same form that it has appeared for many years. Several new stations have been added, but, as pointed out by Dr. Mill, it is still far from being fully representative of all the varying climates of the Empire. Two of the new stations take a place among the "records" for the year:—(1) Madras shows the highest mean annual temperature yet quoted in these tables (83°·2), the lowest being Winnipeg (37°·6); (2) Coolgardie (W. Australia) has the greatest mean daily range (25°·5), the least being Hong Kong (8°·6). Coolgardie owes its great range to high maxima, whereas Winnipeg, which held the place for sixteen years, owed it to low minima. The highest shade temperature was 111°·4 at Adelaide in February, and the lowest −36°·1 at Winnipeg in January. The driest station was Adelaide, mean humidity 59, and the dampest was Trinidad, 82. The latter station had the highest temperature in the sun, 177°·0. The greatest rainfall was at Colombo, 117 inches, and the least at Coolgardie, 14·7 inches. The greatest amount of cloud was at London (6·6), and the least at Grenada (2·9). The returns from Dawson were incomplete; the absolute minimum temperatures for November to January varied from −48° to −51°.

MESSRS. LUCIEN ALLÈGRE AND CO. have opened an exhibition at 99 Regent Street of work done upon the "Luna" printing-out paper, for which they are the agents. This paper has been considerably used on the Continent for three or four years, and is now being introduced into this country. It differs from other silver papers in that the sensitive salts are not carried in a film or layer of medium, but permeate the substance of the paper itself. It is prepared by soaking the paper, or other material, in an aqueous liquid that contains the sensitive salts. The picture may therefore be printed on either side of the paper so far as its sensitiveness is concerned. The platinum toning bath recommended gives a wide range of colours from reds, through browns and violets to black, according to the time that it is allowed to act. A partially exposed print may be developed by an acid developer, and in this way more contrast is obtained. Similar paper is made for the production of transparencies for decorative purposes or for the reproduction of negatives. The advantages of retaining the actual surface of the paper instead of coating it with a film are obvious to those interested in the matter, especially as the brilliancy of the resulting image does not appear to suffer. The exhibition will remain open for a few months.

No. 4 of the first volume of the Indiana University *Bulletin* contains valuable lists of certain sections of the local fauna and flora.

TWENTY years having elapsed since the publication of Mr. G. T. Porritt's well-known "List of Yorkshire Lepidoptera," the author has been well advised in issuing a new and enlarged edition, containing not only additions to the number of species, but likewise recording fuller information with regard to habitat, and including notes on variation. The new issue forms part xxx. of the *Transactions* of the Yorkshire Naturalists' Union.

IN the course of a note on a specimen of a killer-whale recently stranded on the coast of Maine, Mr. F. W. True (*Proc.* U.S. Nat. Mus., xxvii. p. 297) comes to the conclusion that there are probably several distinct forms of these cetaceans, but that there is not yet sufficient material for properly defining them. The typical species, commonly known as *Orca gladiator*, apparently ranges right across the Atlantic.

WE have received a copy of the sixth instalment (from the *Biological Bulletin*) of an essay on the eyes of the blind vertebrates of North America, the author, Mr. E. F. Muhse, discussing in this instance those of a Cuban blind snake (*Typhlops lumbricalis*). Hitherto the structure of the eye in this genus has been known only in two Old World species, and the author institutes comparisons between this organ in the two latter and in the American form.

To the *Bulletin* of the American Museum Dr. J. E. Duerden communicates an article on certain small sea-anemones infesting West Indian sponges. In the dead state they are white, and look not unlike small serpulæ. Although many species and at least two genera have been founded for their reception, they all appear referable to three species of the one genus Parazoanthus, and their range extends from the Bermudas and Bahamas to the Lesser Antilles.

AMONG our weekly budget are two faunistic papers, the one, by Messrs. Snodgrass and Heller, dealing with the birds collected during the Hopkins-Stanford Expedition, and the other, by Messrs. Eigenmann and Kennedy, with a collection of fishes from Paraguay. Several new forms are described in the latter paper, which is from the *Proceedings* of the Philadelphia Academy, but in the former, which is published in the *Proceedings* of the Washington Academy, all the novelties appear to have been previously named in preliminary notices.

PROF. L. ERRERA, of the Royal Academy of Brussels, has favoured us with a copy of the second edition of his brochure entitled "Une Leçon Élémentaire sur le Darwinisme," which is published at Brussels, and is considerably larger than its predecessor. The main arguments in favour of evolution—and more especially Darwinism—are treated in a popular style, emphasis being laid on the importance of the evidence afforded by the phenomena of hybridism and variation, as well as on that derived from the geographical distribution of organisms.

WE have received a copy of the reports of the Ulster Fisheries and Biology Association for 1903—the first working year of that body. It is satisfactory to learn that, under the able management of the hon. director, Prof. G. Wilson, and the hon. secretary, Mr. R. Patterson, the association is starting on its career under the best auspices, and has already done good work. The hon. secretary requests us to state that the laboratory at Larne Harbour, which is provided with a steam-launch and dredging outfit, and has a resident naturalist, is now in working order. The resources of the establishment are at the disposal of any working naturalist, with the proviso that the results of any investigations undertaken should be published through the association. The secretary adds that this is the first opportunity afforded to British naturalists of working with comparative ease and comfort on marine biology in Ireland, and a wide field of labour lies before them.

A VERY complete list of Irish hepatics, with their geographical distribution, has been published by Mr. D. McArdle in the *Proceedings* of the Royal Irish Academy. The writer has taken up the work which was begun by the late Dr. More, who issued a report of Irish hepatics in 1876. The botanical district of Kerry and south Cork is particularly rich in rare species which have been collected in the Killarney district and in the Dingle Peninsula.

A LEAFLET has been issued by the Board of Agriculture having reference to the pine beetle, *Hylesinus piniperda*, which infests all varieties of pine trees, but rarely attacks other soft-timber trees. The damage is mainly caused by the destruction of the young shoots, into which the beetles bore in June or July, with the result that in the autumn many of these break off. The most effectual remedy is to destroy the larvæ which are found under the bark in May.

OF the numerous additions to the botanical department of the Natural History Museum which are recorded in Dr. G. Murray's report for 1902, the most important are the late Mr. Comber's collection of diatoms, including microscopical preparations, lantern slides and photographs, which was presented by his widow, and the herbarium of hepatics which was purchased from Mr. W. H. Pearson. Besides this report, there appears in the *Journal of Botany* (February) a list of Leicestershire lichens, compiled by Mr. Horwood, which is supplementary to that contained in the flora of the county.

MR. HORACE COX has published a fourth edition of Mr. W. B. Tegetmeier's "Pheasants: their Natural History and Practical Management." The new edition has been enlarged.

A SECOND edition of Mr. A. T. Warren's "Experimental and Theoretical Course of Geometry" has been published at the Clarendon Press, Oxford. The propositions required, according to the most recent changes in the syllabus of the universities, for pass examinations at Oxford and Cambridge, have been included in the new edition.

A COPY of the "Year-Book of the Royal Society of London" for 1904 has been received. It contains, in addition to other information, a list of the fellows of the society; particulars of the standing, occasional, and sectional committees; the statutes of the society; the standing orders of the council; the regulations for administering the Government grant for scientific investigations; the report of the council; and the president's anniversary address.

THE publication of a series of monographs on scientific subjects has been commenced by the firm of Vieweg and Son, Brunswick. The first volume, which has just appeared, is a translation into German of Mme. Curie's thesis on radio-active substances, by Herr W. Kaufmann. A list of papers on radio-activity, brought up to October, 1903, is given at the end of the volume.

THE Smithsonian Institution has just published an index to the literature of thorium from 1817 to 1902. The compilation has been carried out by Dr. C. H. Joüet, of Columbia University, and 1123 scientific papers dealing with the chemistry of thorium are indexed in the publication.

IN the January number of the *Proceedings* of the American Academy of Arts and Sciences, Mr. W. E. McElfresh describes experiments on the influence of occluded hydrogen on the electrical resistance of palladium. The resistance increases with the quantity of hydrogen occluded, but the two factors are not strictly proportional. By the occlusion of 1030 volumes of hydrogen, which represents the maximum absorption, the electrical resistance is increased by about 68 per cent.

THE reaction between potassium iodide and hydrogen peroxide in neutral aqueous solution has been the subject of frequent investigation. According to experiments of Walton, published in the current number of the *Zeitschrift für physikalische Chemie*, it appears to be established that the decomposition of the hydrogen peroxide with the evolution of oxygen is due to a catalytic action of the iodine ions. The production of small quantities of iodine and alkali makes it probable that hypoiodite is formed as an intermediate product, the chief reaction taking place according to the equations

$$KI+H_2O_2=KIO+H_2O_2$$
$$KIO+H_2O_2=KI+H_2O+O_2$$

The second reaction takes place with very great velocity in comparison with the first.

THE *Comptes rendus* for January 25 contains an account of the experiments recently made by Profs. Dewar and Curie on the gas "occluded or liberated" by radium bromide. Three series of experiments are described. In the first series a glass tube containing 0·4 g. of the salt was exhausted by means of the mercury pump, and was found to liberate gas to the extent of about 1 c.c. per month; this gas, examined spectroscopically, gave only the hydrogen and mercury spectra. The salt was then taken to the Royal Institution, transferred to a quartz tube, connected to the mercury pump, and heated to the melting point of the salt; the gas liberated was passed through three U-tubes cooled with liquid air to condense the emanation and the less volatile gases, and collected over mercury. The gas, which had a volume of 2·6 c.c. at atmospheric pressure, was intensely luminous, and three days exposure in a quartz spectroscope showed the presence of the three chief bands of the nitrogen spectrum. During this time the glass tube had become violet in colour, and the volume of the gas had been spontaneously reduced to one-half of its original volume. A small sample of the gas was transferred to a Geissler tube, and again exhibited the nitrogen bands. Finally, the nitrogen in the Geissler tube was frozen out by means of liquid hydrogen, when a very high vacuum was produced, but the spark spectrum again indicated the presence of nitrogen and no other gas. The quartz tube containing the fused radium bromide was sealed off whilst still vacuous by means of the oxyhydrogen blowpipe and taken back to Paris. It was there examined, twenty days later, by M. Deslandres, who covered the ends of the tube with tinfoil and illuminated the gas by means of a Ruhmkorff coil; three hours' exposure in a quartz spectroscope revealed a complete helium spectrum, but the light emitted spontaneously by the tube gave a continuous spectrum free from light or dark bands.

THE additions to the Zoological Society's Gardens during the past week include two Ring-necked Pheasants (*Phasianus torquatus*) from China, presented by Mr. Eardley Wilmot Holt; an Undulated Grass Parrakeet (*Melopsittacus undulatus*) from Australia, presented by Mrs. Clement Shorter; a Bullfinch (*Pyrrhula europoea*), European, presented by Mr. R. F. Hearnshaw; an Indian Python (*Python molurus*) from India, presented by Mr. W. A. Harding; a Citron-crested Cockatoo (*Cacatua citrino-cristata*) from Timor Laut, deposited; an Arctic Fox (*Canis lagopus*) from the Arctic regions, purchased.

## OUR ASTRONOMICAL COLUMN.

OBSERVED CHANGES ON THE SURFACE OF MARS.—During his observations of the Martian surface on April 19, 1903, Mr. Lowell, of Flagstaff, was surprised to see that the colour of the Mare Erythræum was a decided "chocolate-brown," whilst the neighbouring Syrtis was of the normal "blue-green." Although the sea was similarly situated for observation on March 22, this peculiarity was not seen then, therefore the change must have taken place somewhere between these two dates.

When this region was again favourably placed for observation, viz. on May 26, the Mare Erythræum had lost the brown colour except in the southern regions, and the remaining colour slowly disappeared southwards, until on May 29 only a small region near to Hellas was affected, and this became normal on May 30. During the next presentation (June 30–July 7) there was no suspicion of any chocolate coloration. Taking the time of maximum brightness of the brown colour as the time of minimum for the "blue-green" which it supplants, Mr. Lowell finds that this minimum coincides, in point of time, with the minimum visibility of the canals, and, further, that the minima also coincide in latitude, travelling southwards in each case as the number of days since the summer solstice increases. This is plainly shown by the curves and tables in which Mr. Lowell displays the results of his observations of the respective phenomena.

From these data he argues that the normal blue-green colour is due to vegetation, which, owing to the absence of large bodies of water on the planet's surface, can only thrive when fed by the water which fills the canals at the melting of the polar snows. He also suggests that the brown colour, which accompanied the minimum visibility of the canals, is due to the exposure of the bare soil which probably covers the beds of such "seas" as the Mare Erythræum (Lowell Observatory *Bulletin*, No. 7).

THE GEOGRAPHICAL DISTRIBUTION OF METEORITES.—In an article contributed to the February number of the *Popular Science Monthly*, Dr. O. C. Farrington, of the Field Columbian Museum (U.S.A.), discusses the distribution of the meteorites which have been discovered on the earth's surface. He points out that, according to Prof. Berworth, of Vienna, about 900 meteorites reach the earth annually, but from various causes the number likely to be observed is only about 55 per annum, or 5500 per century. As a matter of fact, there have only been about 350 recorded falls since the fifteenth century, yet there have been 50 well authenticated falls in France during the last 100 years.

Dr. Farrington explains the apparent discrepancy by pointing out that on a map of the world, on which he has marked the places where meteorites have been found, these places are mostly in civilised and thickly populated countries, and it may therefore be surmised that the residue are either not seen or else not recorded. Another very interesting point illustrated by the map is the comparatively large proportion of meteorites which have fallen in mountainous regions (*e.g.* the Himalayas, the Alps, the Appalachian Mountains, &c.), and to explain this Dr. Farrington suggests either increased gravitational effects near to these mountainous ranges or else the actual mechanical arrestation of the meteorites by the projecting mountains.

An analysis of the types of known meteorites discloses curious "grouping"; for instance, including both "falls" and "finds," it is seen that of the 256 meteorites known in the western hemisphere, 182 are "irons" and only 74 are "stones," whilst of the 378 known in the eastern hemisphere, 299 are "stones" and 79 are "irons." Prof. Berworth has suggested that the dry air of the large desert areas of the New World has caused the preservation of the irons, whilst the moist atmosphere of the Old World has caused their disintegration, but Dr. Farrington points out that quite a fair proportion of the "irons" found in America have come from the region surrounding the Appalachians, where a comparatively moist atmosphere obtains. Several other apparent localisations of particular types are discussed by Dr. Farrington in his interesting article.

AN ATLAS OF SOLAR PHOTOGRAPHS.—At the meeting of the Paris Académie des Sciences held on February 1, Prof. Janssen presented an atlas of photographs of the sun's disc which have been taken regularly at the Meudon Observatory since 1876. These photographs have been chosen, from more than 6000 plates obtained between 1876 and 1903, in order to show the finest examples of the various solar phenomena, and they display a fairly complete history of the solar changes during that period.

The photographs were taken with an especially constructed camera which produces a nearly monochromatic image, using the exceedingly actinic light in the violet region about HH′. An exposure of 1/3000 of a second was generally found sufficient, and therefore the resulting pictures show all the finer details of the solar surface beautifully defined.

In presenting the atlas Prof. Janssen directed attention to the great importance of obtaining such a record at several widely separated observatories, because, in the light of their inter-relation with meteorological and magnetic phenomena, it is obviously desirable to have a *complete* record of the changes which occur on the sun's surface, and such a record cannot be secured if only one or two observatories are taking photographs. Recognising the importance of this record to meteorologists and physicists, it is intended to prepare a large edition of the atlas, on a smaller scale, for wide distribution (*Comptes rendus*, No. 5).